

Upper Missouri Basin Climate/Drought Early Warning Webinar: El Niño

Dr. Dennis Todey
State Climatologist
South Dakota State Univ.
dennis.todey@sdstate.edu
605-688-5678

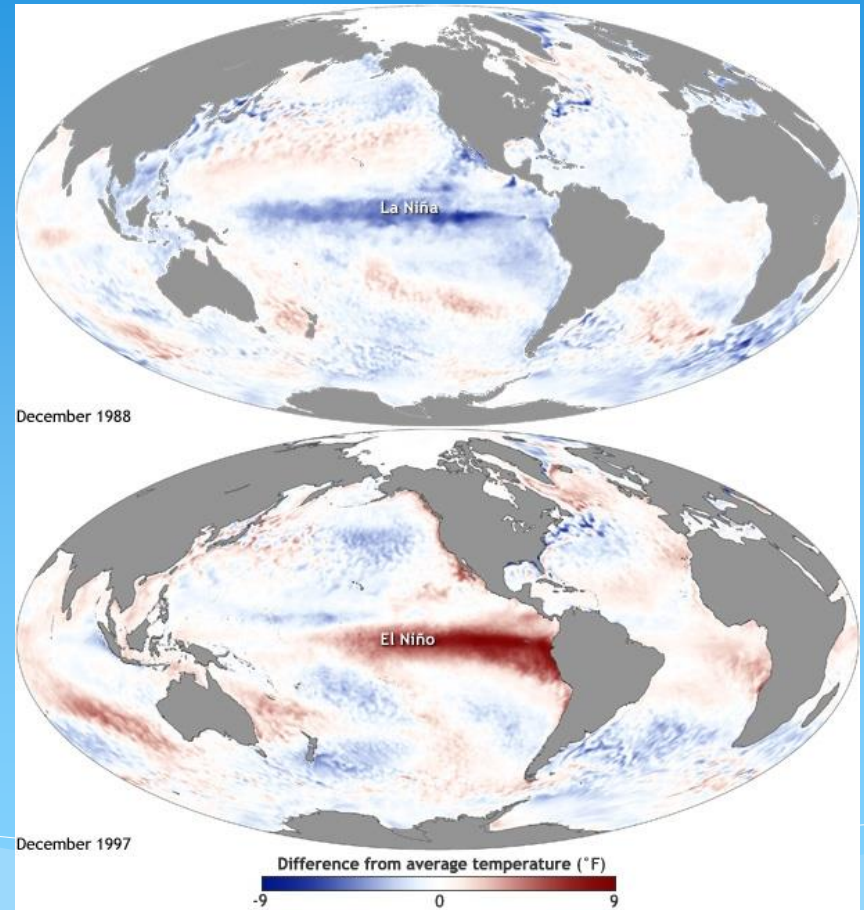


Photo taken Feb. 19, 2000



Sea Surface Temperatures – 1988 La Niña and 1998 El Niño



General Information

- * **Providing climate services to the North Central U.S.**
 - * Collaboration Activity Between:
 - * State Climatologists
 - * Doug Kluck & John Eise (National Oceanic and Atmospheric Admin.)
 - * American Association of State Climatologists (AASC)
 - * Midwest and High Plains Regional Climate Centers (RCC)
 - * National Drought Mitigation Center (NDMC)
 - * US Department of Agriculture (USDA)
 - * US Army Corps of Engineers (USACE)

- * **Next Regular North Central U.S. Climate/Drought Outlook Webinar**
 - * August 15, 2015 (1 PM CDT) w/Jim Angel – Illinois State Climatologist

- * **Access to Future Climate Webinars and Information**
- * <http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars>

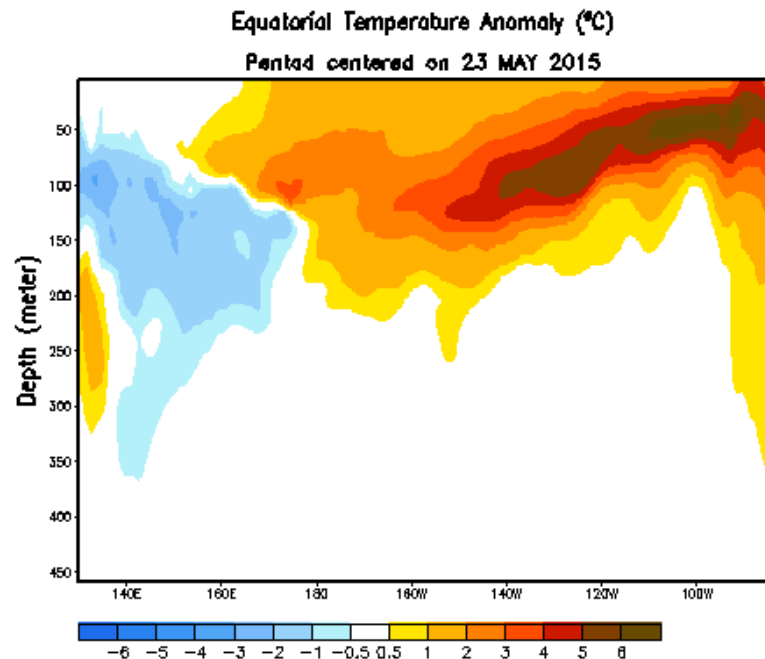
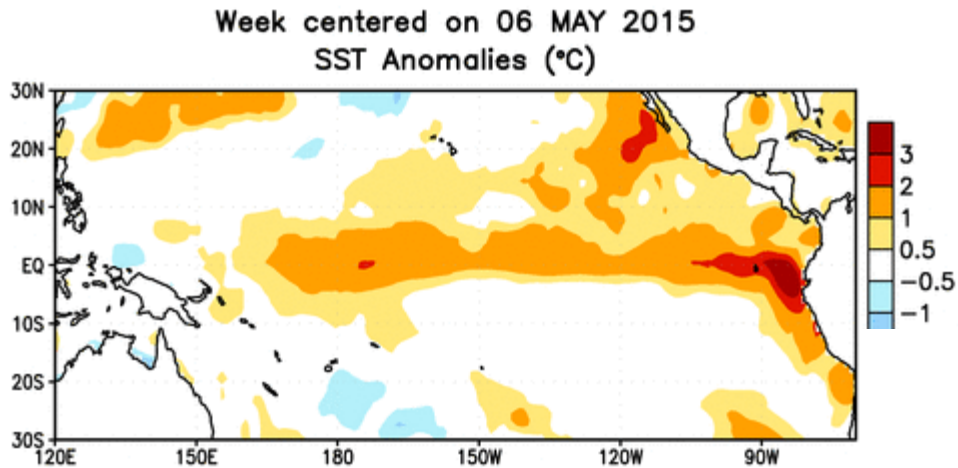
- * <http://mrcc.isws.illinois.edu/webinars.htm>
- * <http://www.hprcc.unl.edu/webinars.php>
- * **Open for questions at the end**

Agenda

- * **Current Conditions**
- * **Impact Potential**
- * **Outlooks**
 - * **El Niño**
 - * **Fall-Winter**



Warm water progression in Pacific



ENSO Alert System Status: El Niño Advisory

Large amount of warm water sub-surface
Likely to continue.

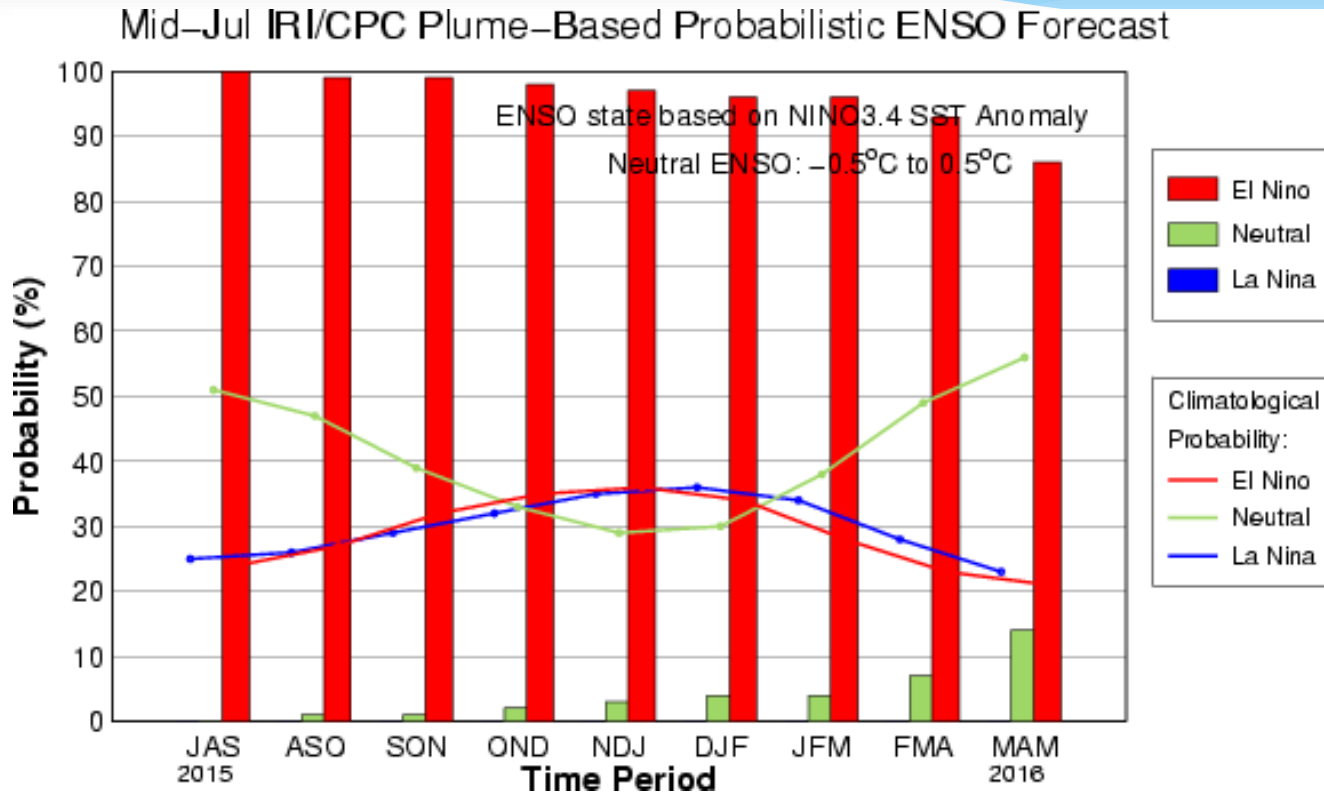
CPC – Strong El Niño

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml>

CPC/IRI Probabilistic ENSO Outlook

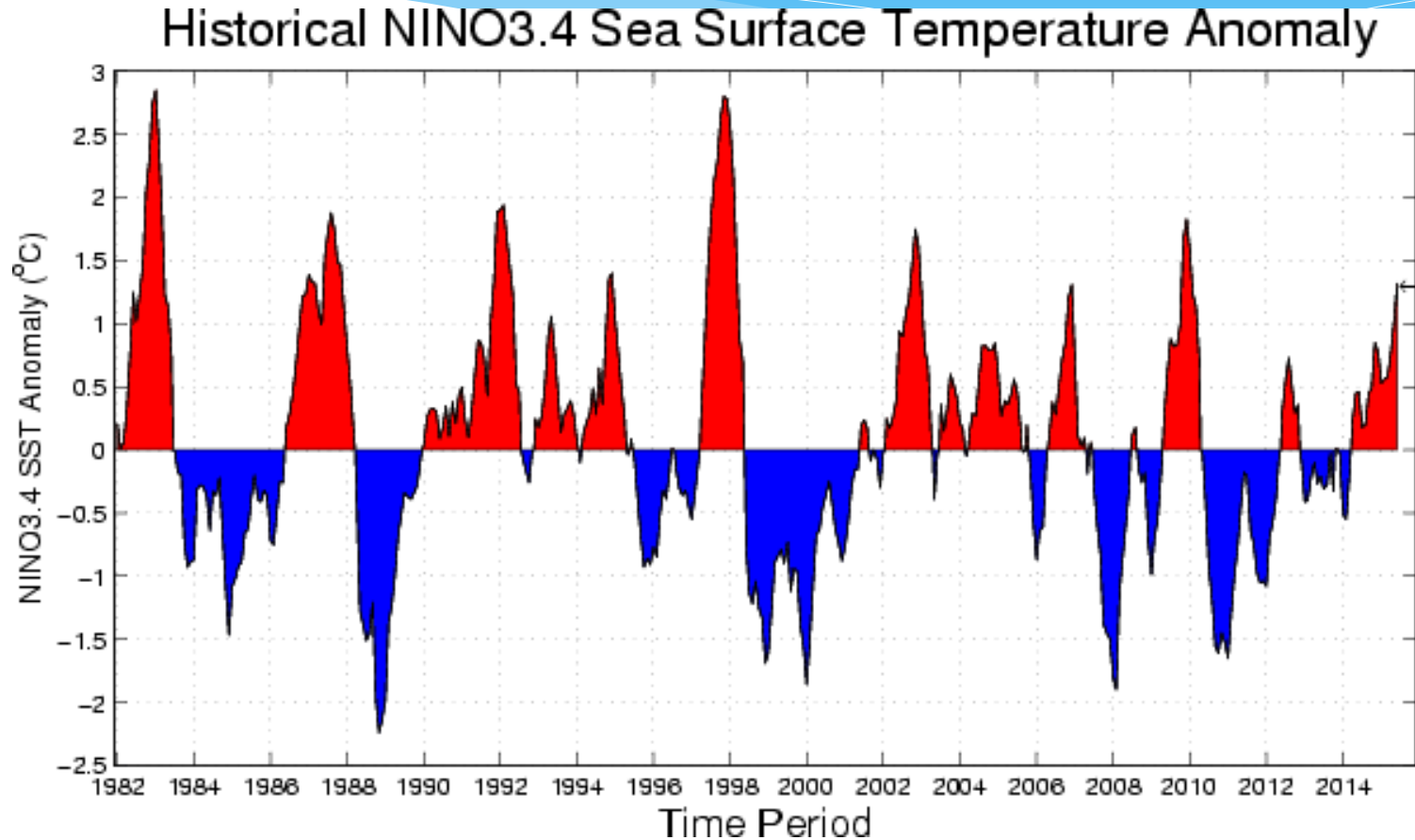
Updated: mid-July 2015

The chance of El Niño is approximately >90% through 2015.



<http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

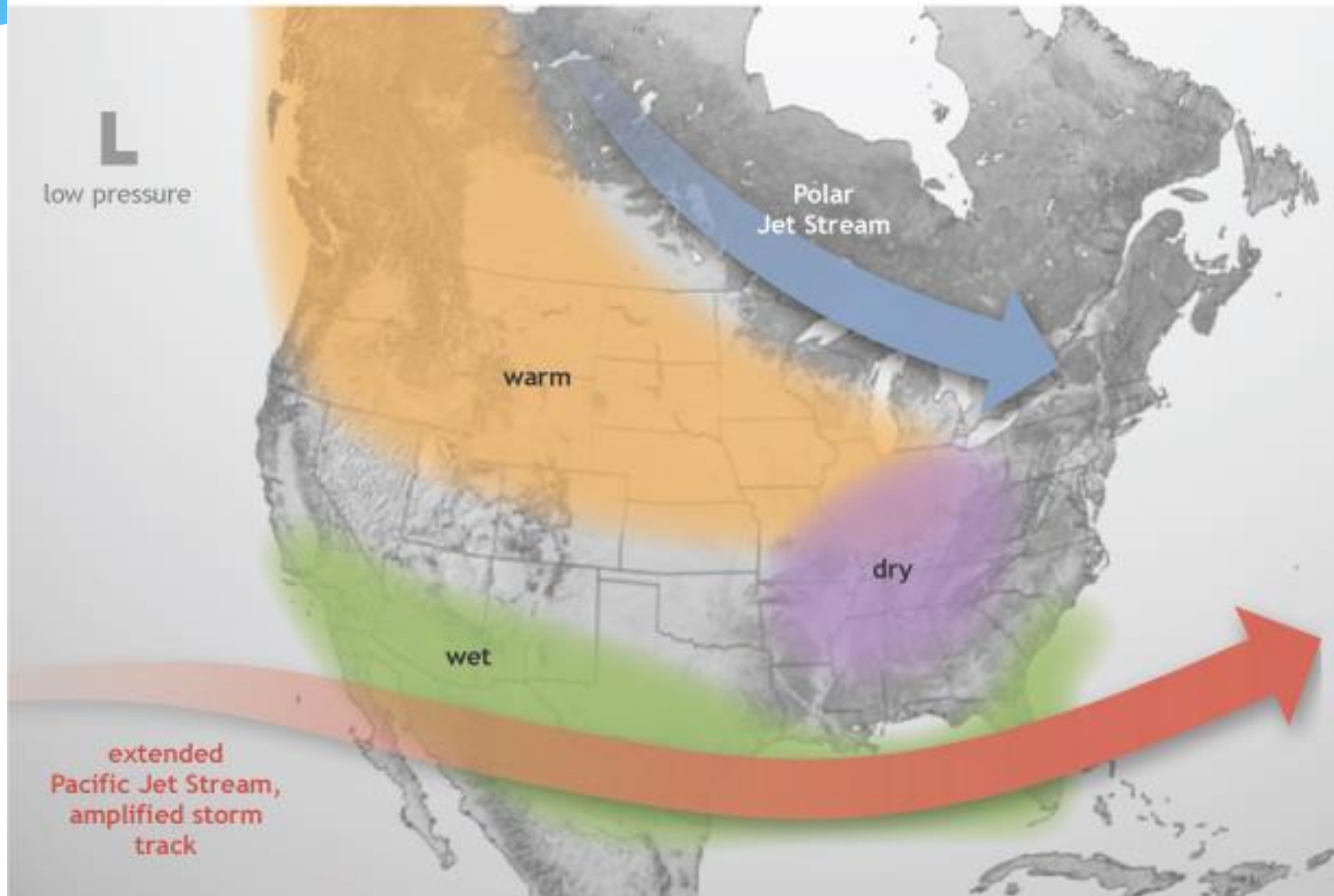
Recent El Nino events



<http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

El Niño – Generalized Image

Wintertime El Niño pattern

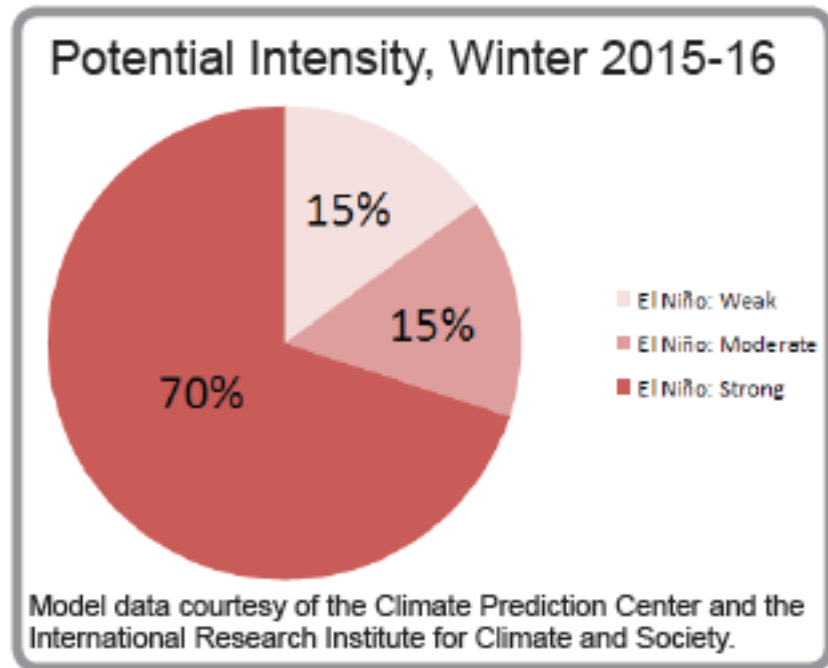


El Niño – not a matter of if

El Niño Strength

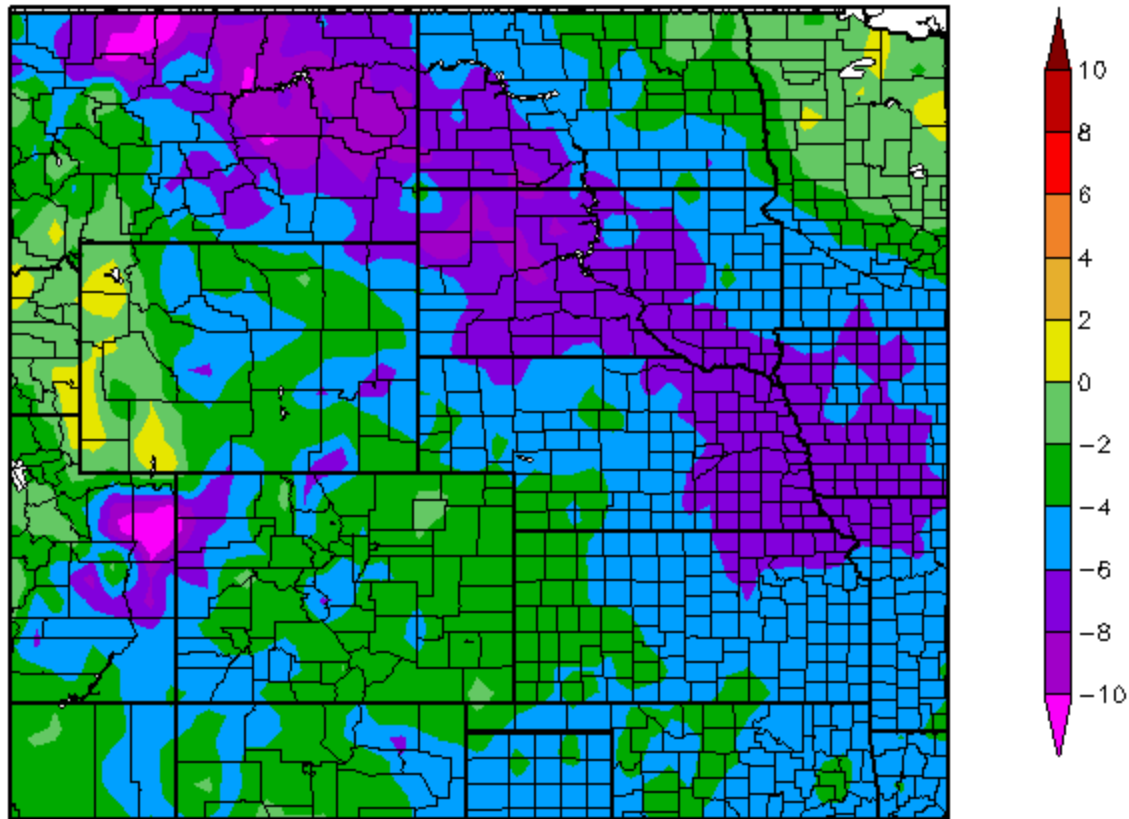
Winter 2015-16

- * 70% chance strong
- * Nearly guarantee El Niño at some level this winter
- * Stronger El Niño – more likely impact
- * Spring is another topic....



Impacts Not Guaranteed – 2009-10 El Niño

Departure from Normal Temperature (F)
12/1/2009 – 2/28/2010



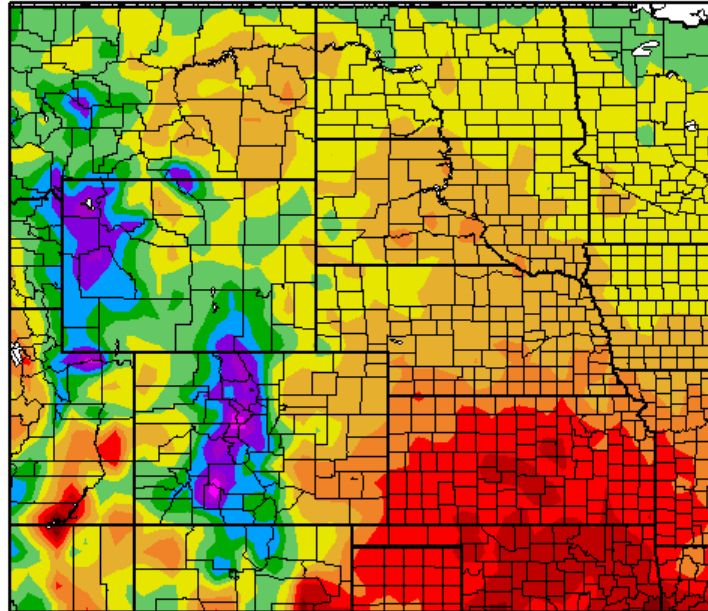
Generated 6/18/2012 at HPRCC using provisional data.

Regional Climate Centers

Review/Current Conditions

Most recent 30-day temperatures

Temperature (F)
6/29/2015 – 7/28/2015



Generated 7/29/2015 at HPRCC using provisional data.

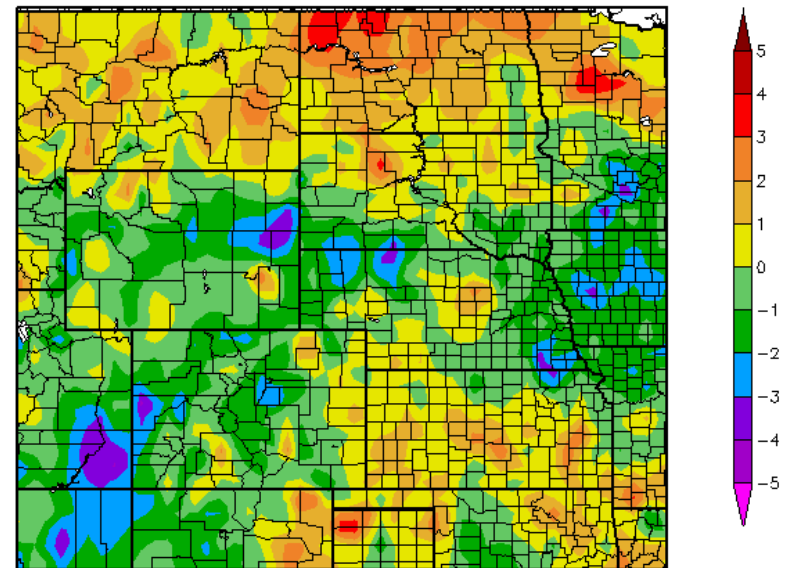
Regional Clim

**Mixed conditions – warmer
than avg. MT, ND, KS, part
SD
Cooler WY, NE**

<http://www.hprcc.unl.edu/maps/current/>

HPRCC – Regional Climate Centers

Departure from Normal Temperature (F)
6/29/2015 – 7/28/2015

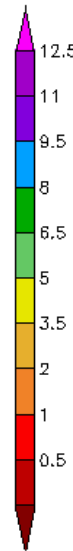
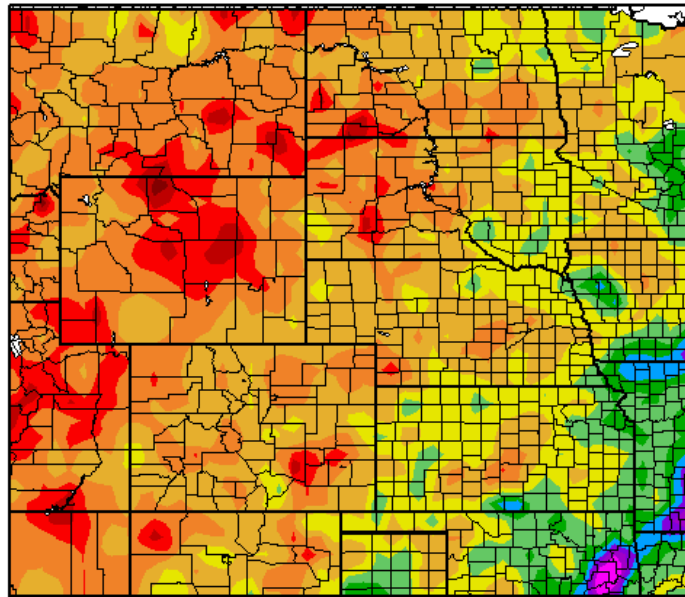


Generated 7/29/2015 at HPRCC using provisional data.

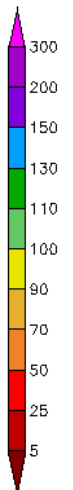
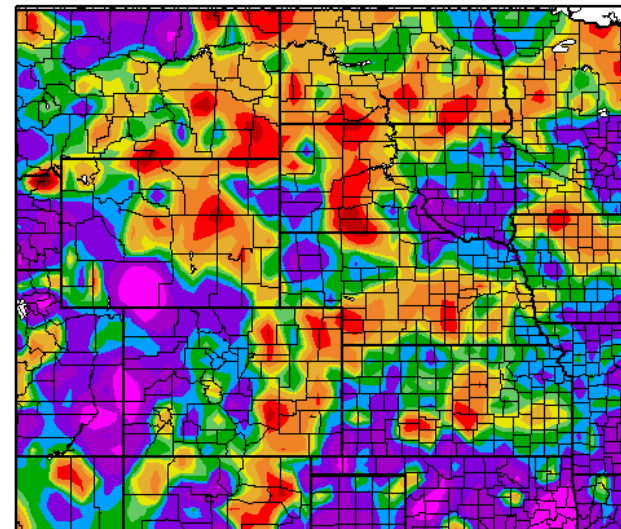
Regional Climate Centers

Most recent 30-day precipitation

Precipitation (in)
6/29/2015 - 7/28/2015



Percent of Normal Precipitation (%)
6/29/2015 - 7/28/2015



Generated 7/29/2015 at HPRCC using provisional data.

Regional Climate C

**Also very mixed - spotty
very wet areas, large dry
area**

**Year review - Dry - wetter -
mixed**

<http://www.hprcc.unl.edu/maps/current/>

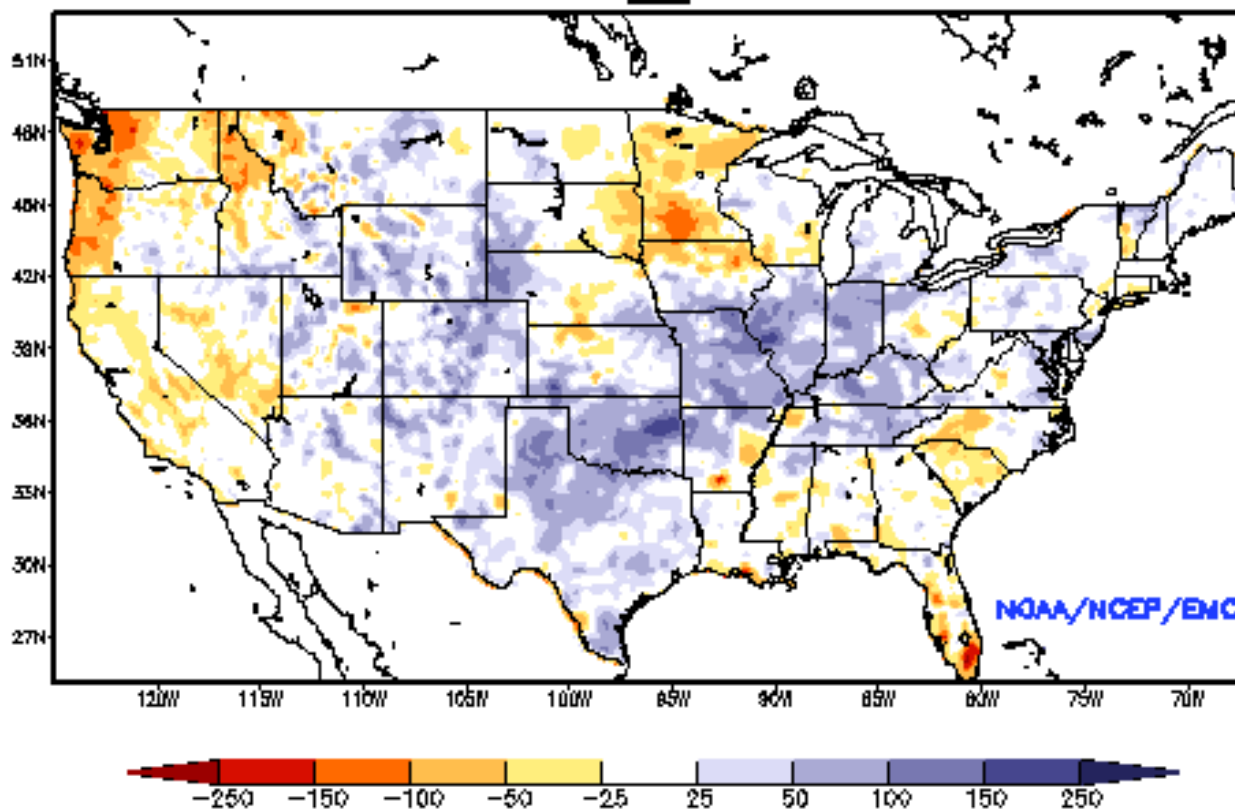
HPRCC - Regional Climate Centers

Generated 7/29/2015 at HPRCC using provisional data.

Regional Climate Centers

Soil Moisture

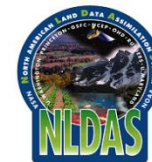
Ensemble-Mean - Current Total Column Soil Moisture Anomaly (mm)
NCEP NLDAS Products ___ Valid: JUL 24, 2015



Wet area in the northern Plains deeper soil moisture

Soil Moisture Anomaly in millimeters

<http://www.emc.ncep.noaa.gov/mmb/nldas/drought/>

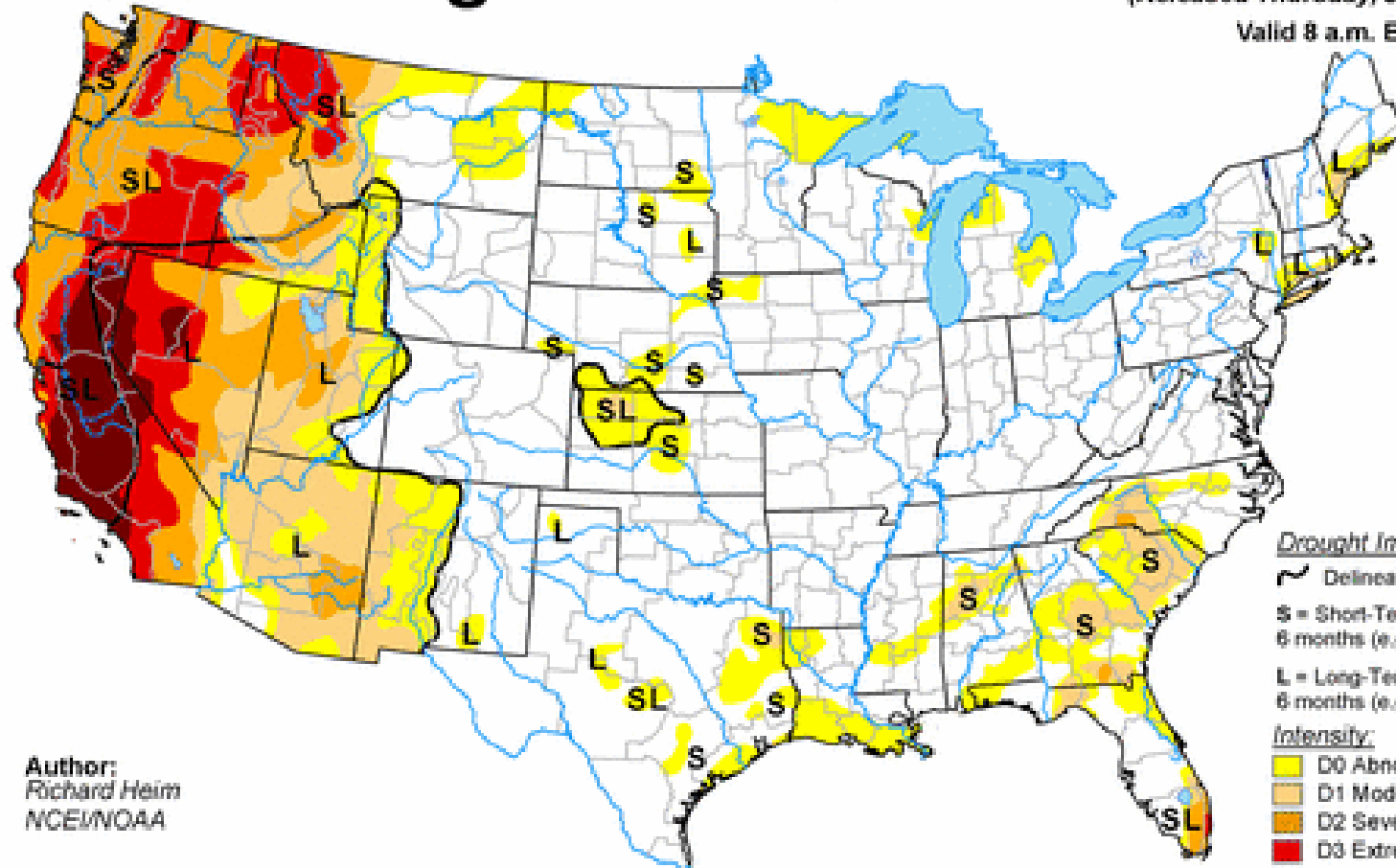


U.S. Drought Monitor


July 28, 2015

(Released Thursday, Jul. 30, 2015)



Valid 8 a.m. EDT



Drought Impact Types:

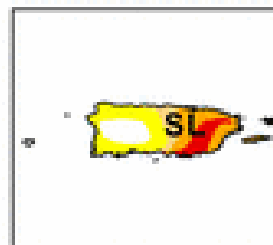
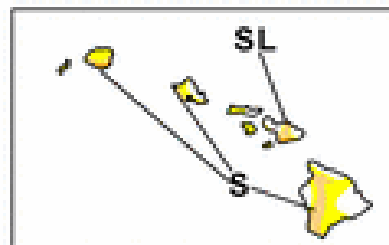
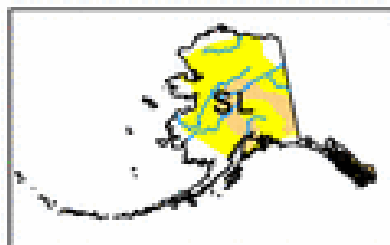
-  Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCEI/NOAA



<http://droughtmonitor.unl.edu/>

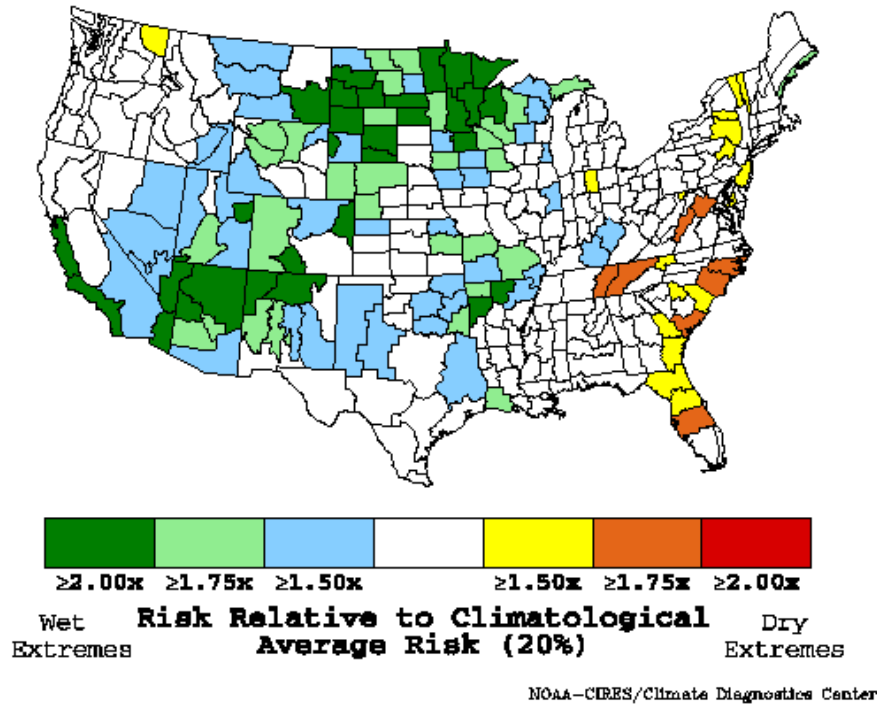
Composites/Extremes Potential

El Nino extremes

- * Likelihood of extreme events – precip or temp in highest/lowest 20% of years.
- * <http://www.esrl.noaa.gov/psd/enso/climaterisks/>

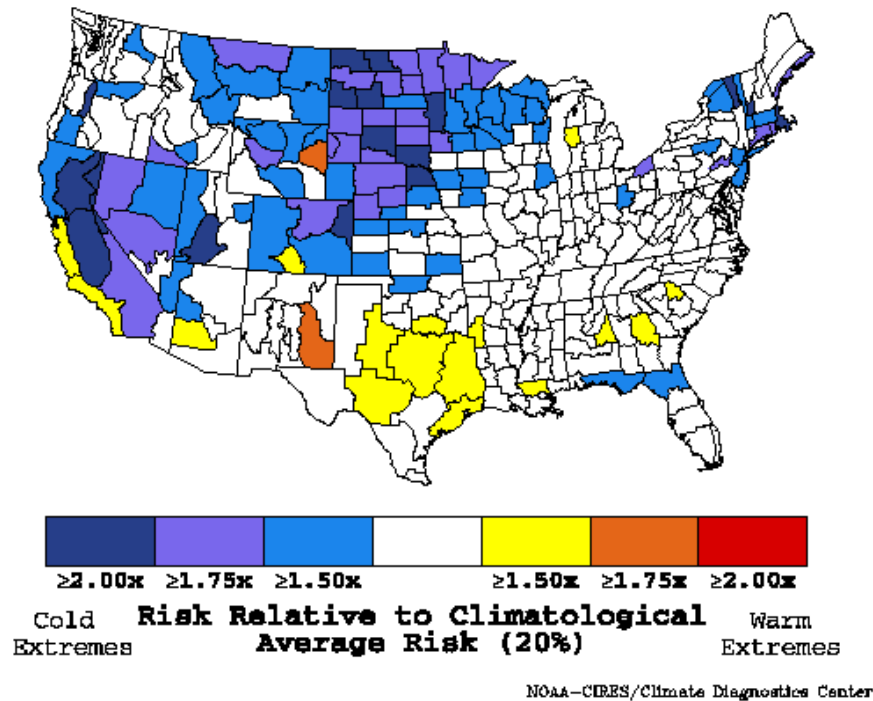
Sept. – Nov. Precip.

SON Precipitation Extremes During El Nino Risk of Extreme Wet or Dry Years



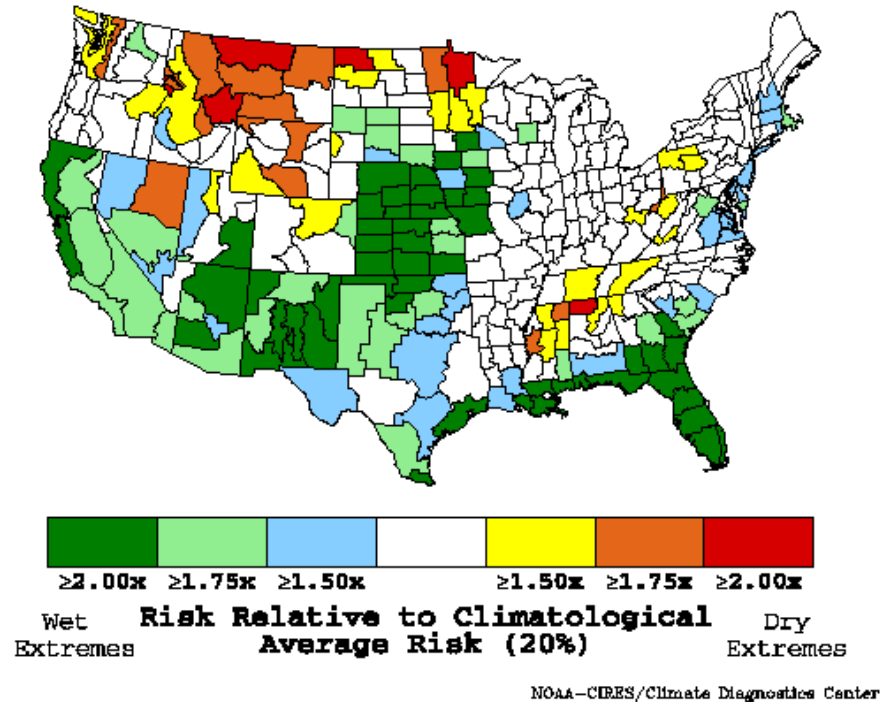
Sept. – Nov. Precip.

**SON Temperature Extremes During El Nino
Risk of Extreme Warm or Cold Years**



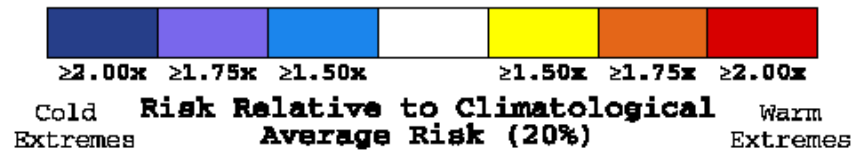
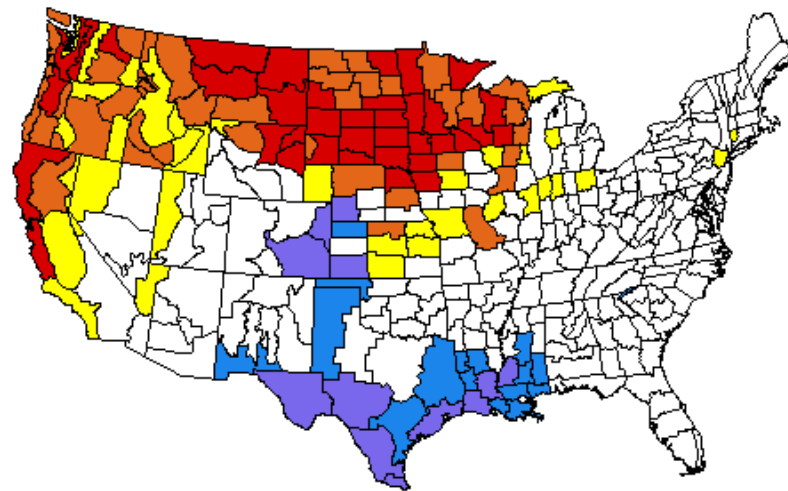
Dec. – Feb. Precip.

**DJF Precipitation Extremes During El Nino
Risk of Extreme Wet or Dry Years**



Dec. – Feb. Temp.

**DJF Temperature Extremes During El Nino
Risk of Extreme Warm or Cold Years**



NOAA-CIRES/Climate Diagnostics Center

Impacts

The image features a solid blue background with a white wavy line at the bottom. The word "Impacts" is centered in the upper half of the image in a white, sans-serif font.

Upper Missouri Basin Impacts

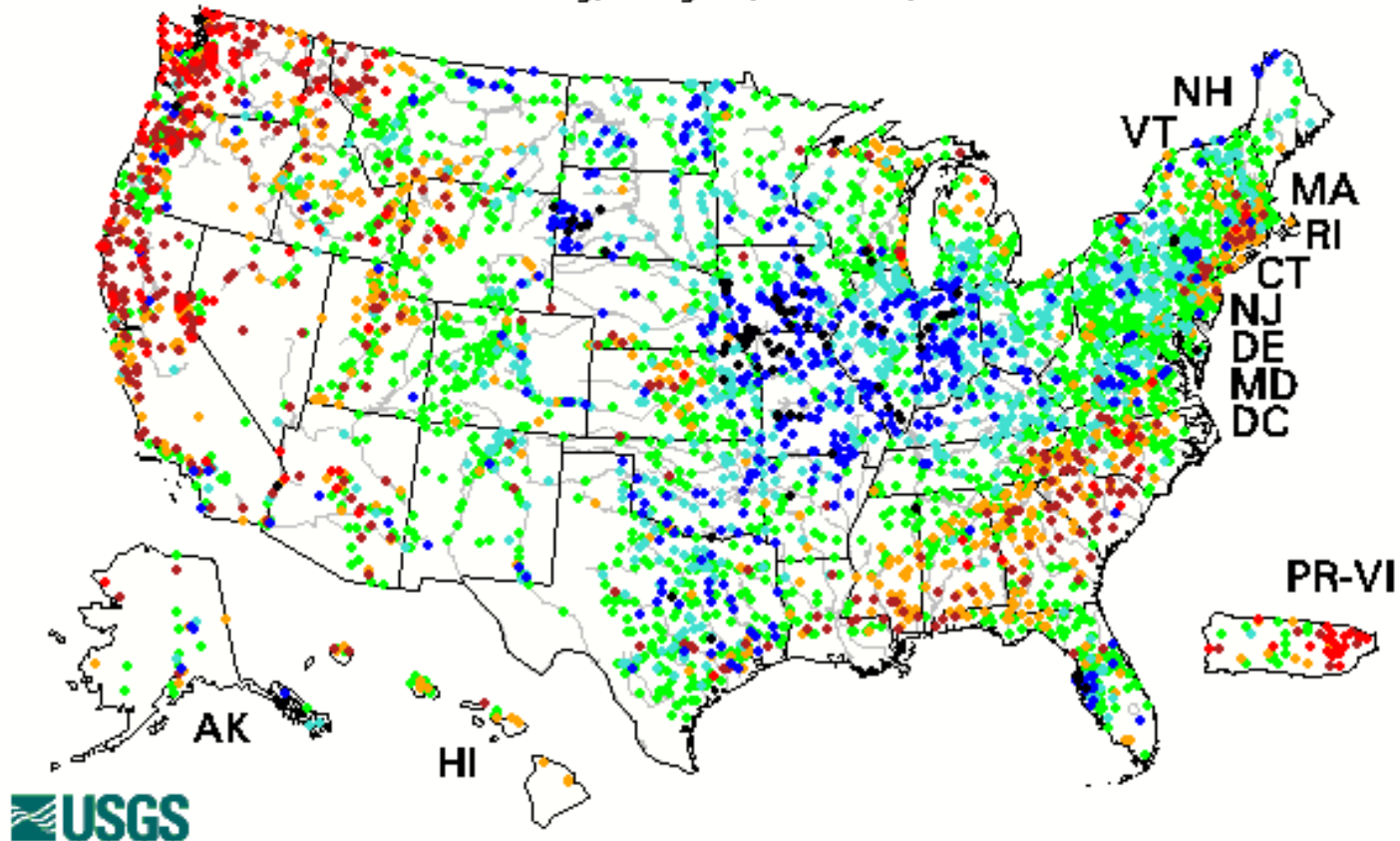
- * Water/Missouri River (snowpack, plains & mountains)
- * Agriculture
- * Fire
- * Energy
- * Municipal Costs (storm costs)

Impacts

Missouri River/Water

7-Day Average Streamflow

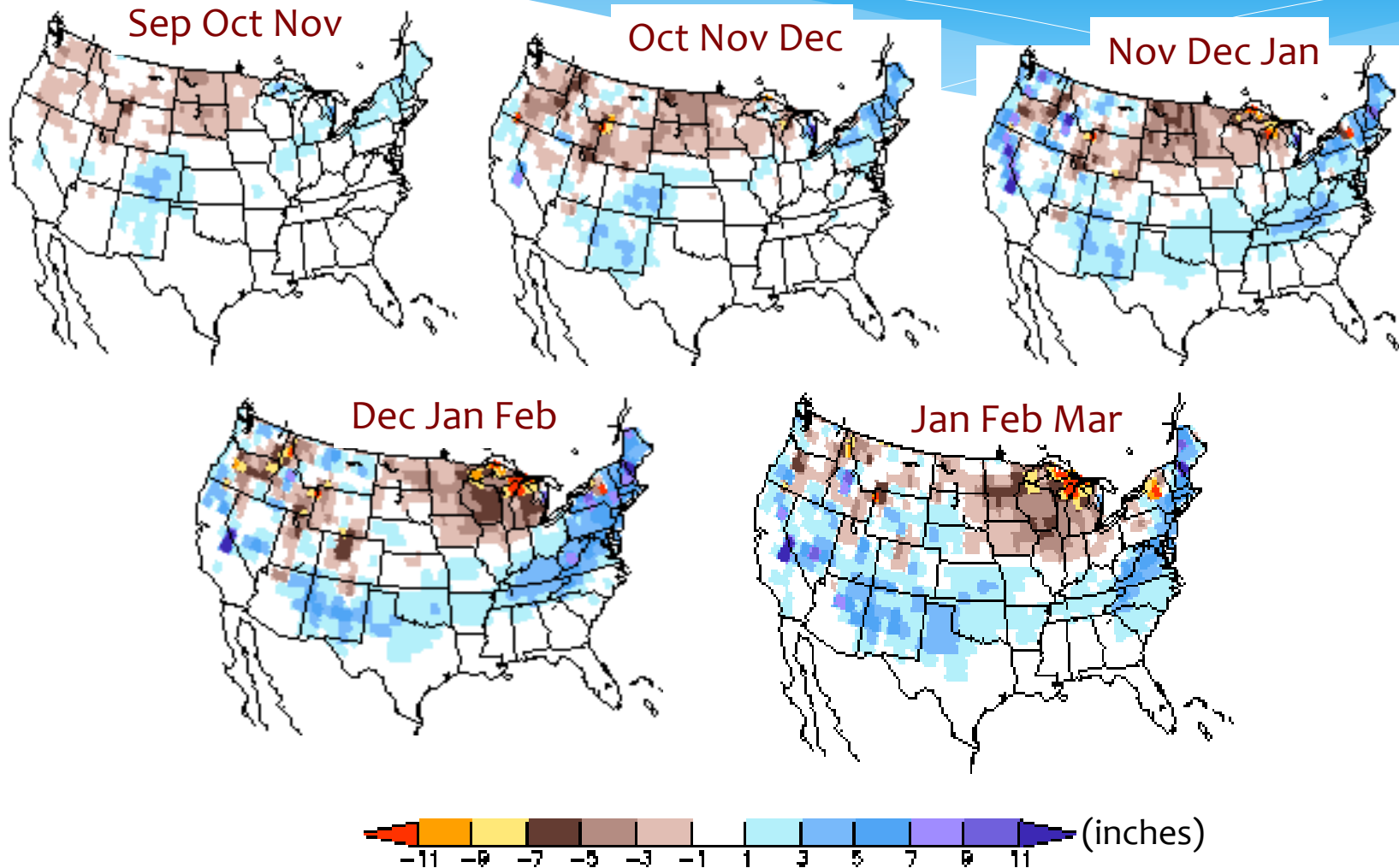
Wednesday, July 29, 2015 10:30ET



Wednesday, 15 Apr. 2015

Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

Snow under El Niño (1950-2014)



- Potential for below average snowpack and snow cover on the ground in much of the North Central region during El Niño

Impacts Agriculture



Ag Issues

- * Currently no major wetness issues (a few minor ones) – some dryness issues in the Missouri Basin
- * Crop development generally OK – rangeland OK
- * Fall Wetness could lead to delayed harvest – if very wet
- * Warmer winter – winter wheat?
- * Rangeland
- * Spring – question mark on shift out of El Niño

Impacts Fire

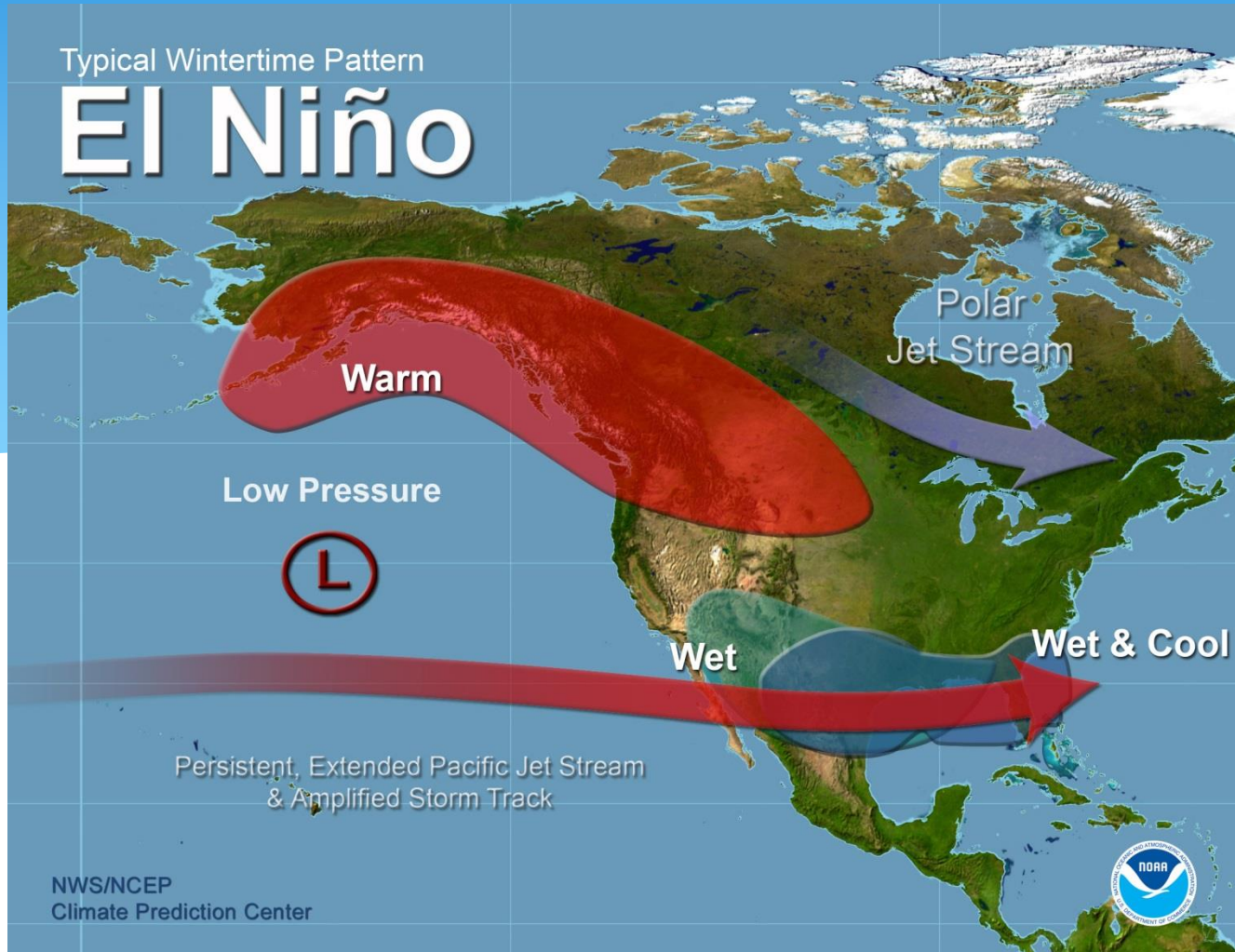


Fire Issues

- * Complicated issues – what is the problem this year?
 - * Dry surfaces
 - * Less snow
 - * Wet fall?
- * Affected by fall pcp
- * Open winter likely plains quite likely
- * Likely location specific



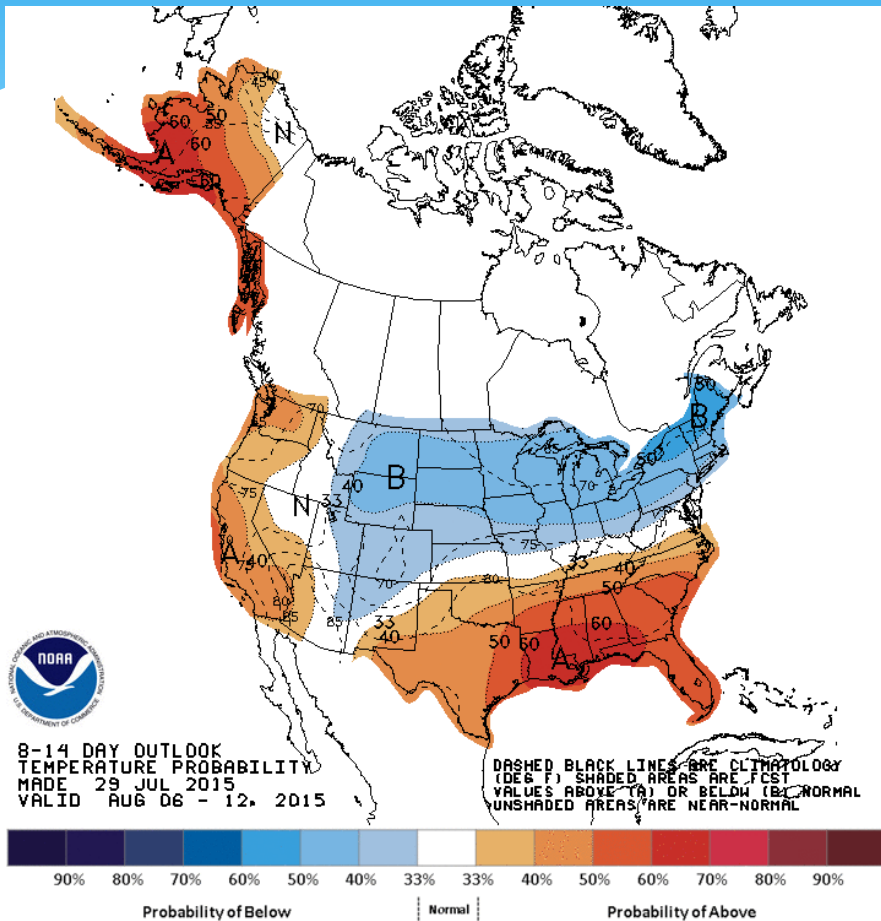
Outlooks



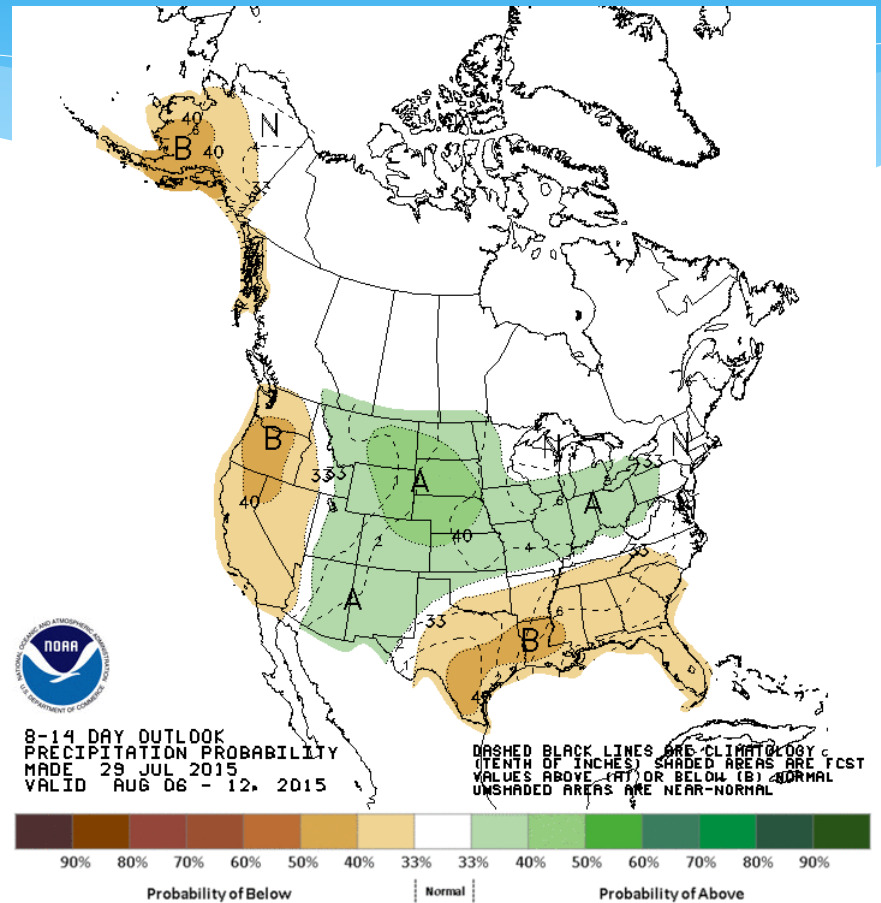
Climate Outlooks

- * **8-14 day outlook**
- * **August**
- * **Fall and Winter Outlooks**
- * **Seasonal Drought Outlooks**
- * **Spring – how quickly does El Niño weaken?**

Temperature and Precipitation Probabilities for Aug. 6–12, 2015

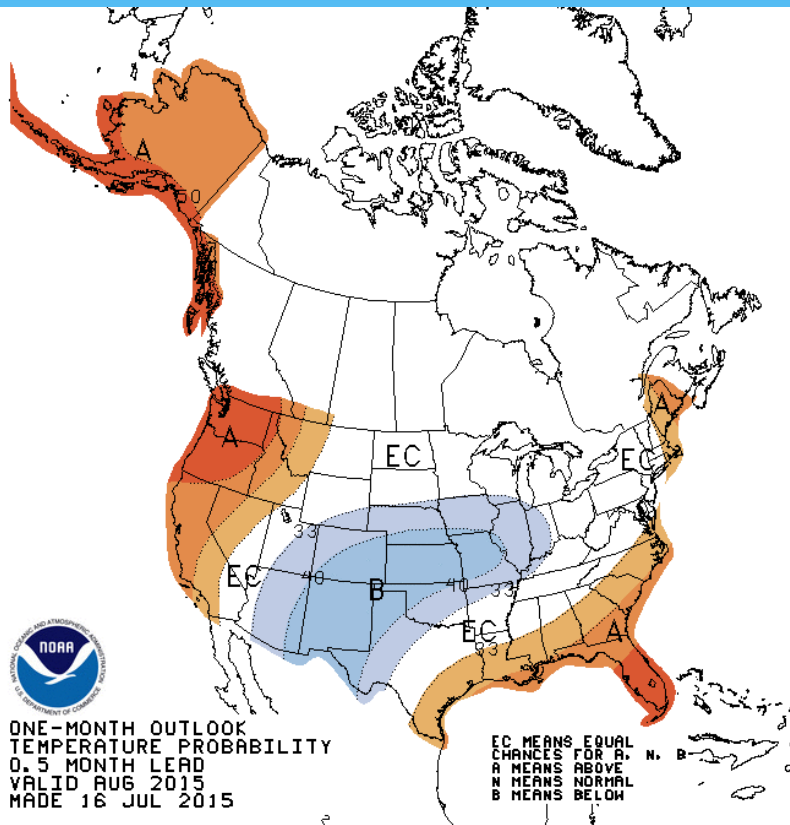


Temperature

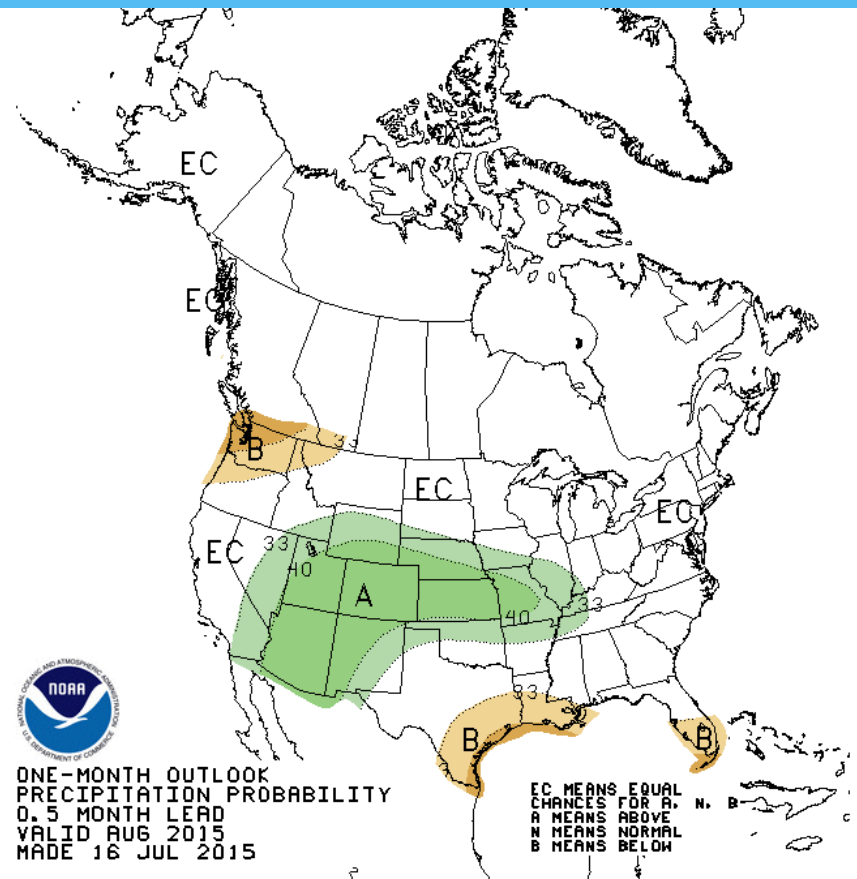


Precipitation

August Temperature and Precipitation Probabilities



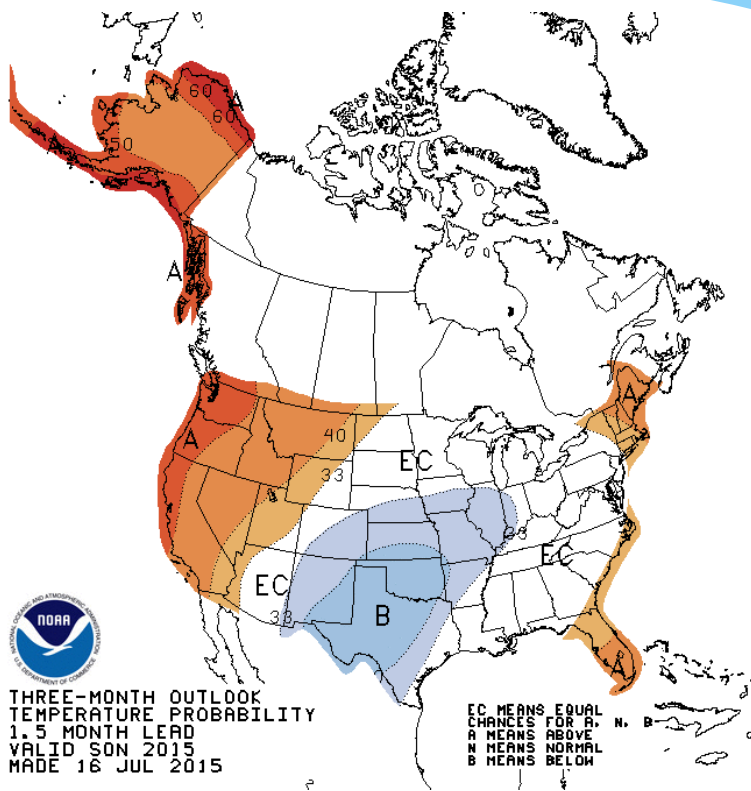
Temperature



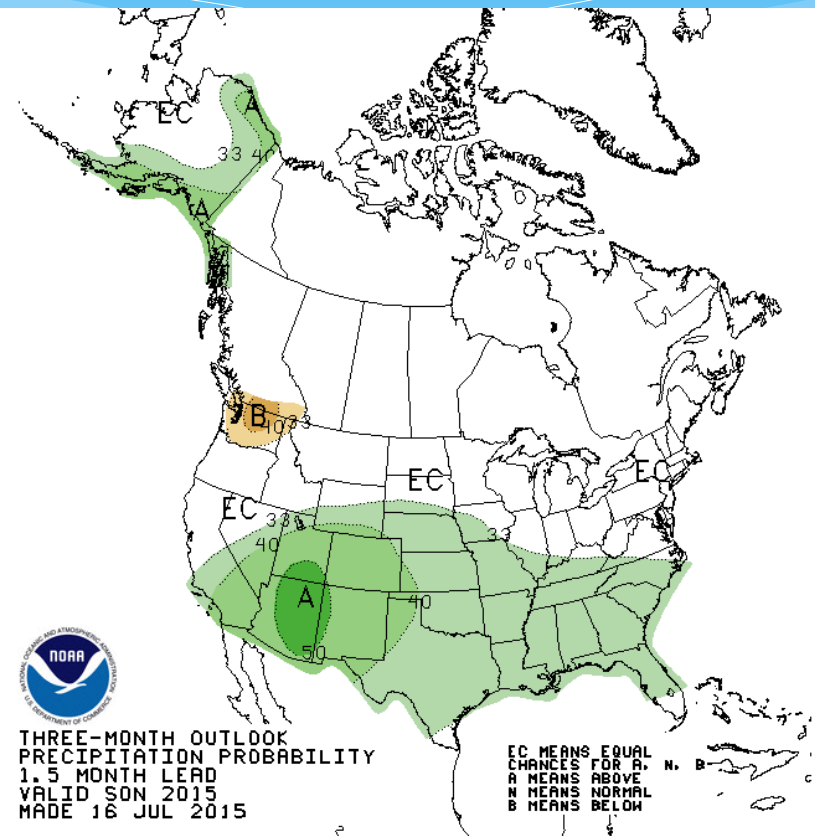
Precipitation

<http://www.cpc.ncep.noaa.gov/products/predictions/30day/>

3 Month Temperature and Precipitation Probabilities (Sept. – Nov.)

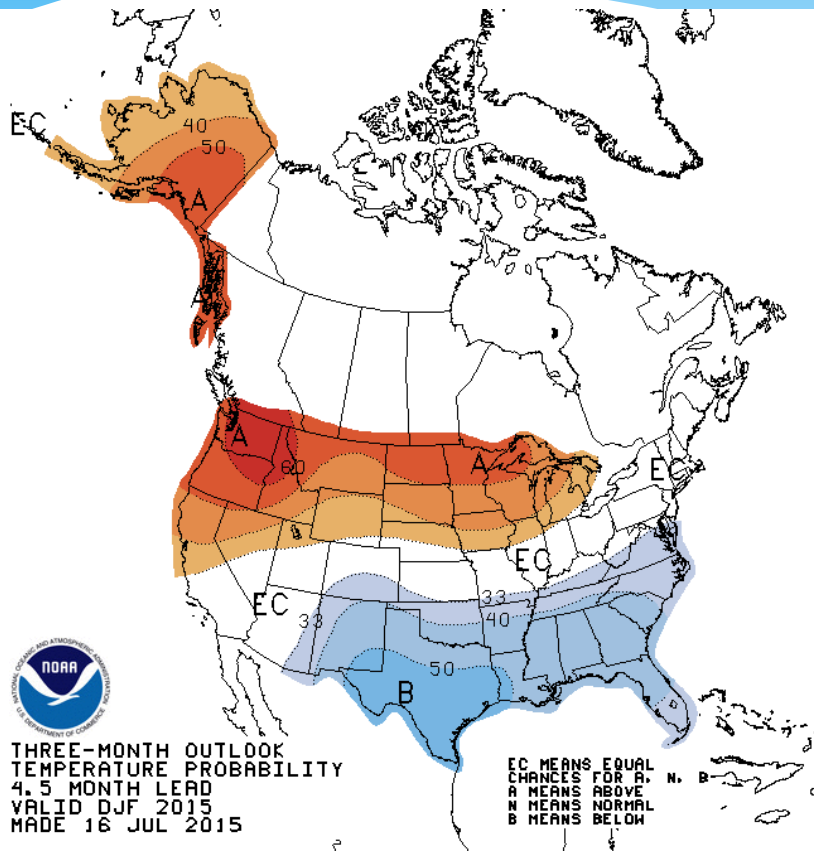


Temperature

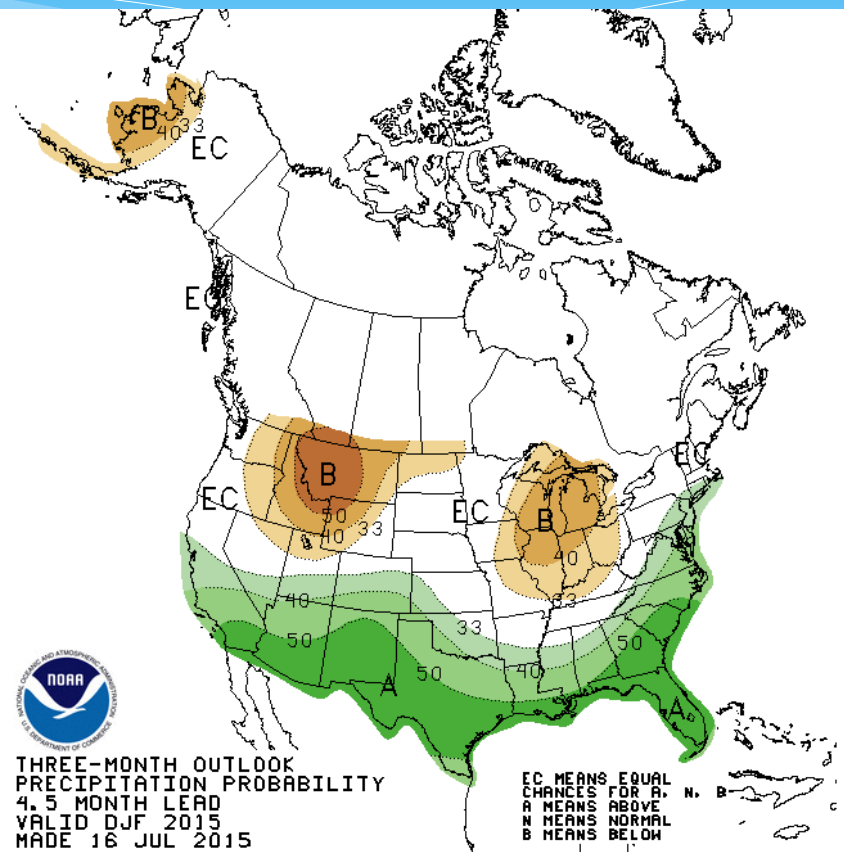


Precipitation

3 Month Temperature and Precipitation Probabilities (December - February)



Temperature

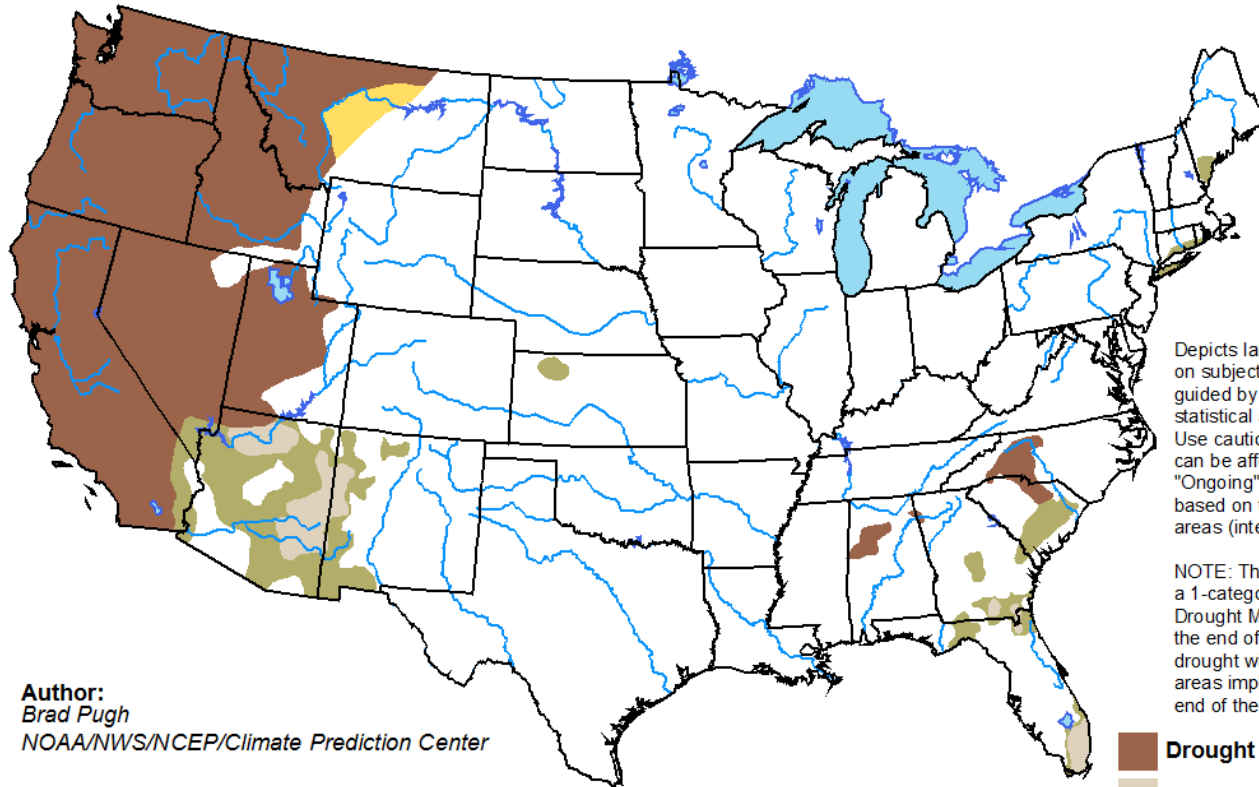


Precipitation

Drought Outlook through Oct 31

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period





Valid for July 16 - October 31, 2015
Released July 16, 2015

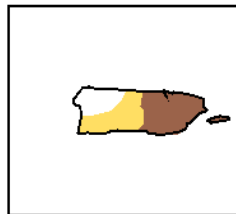
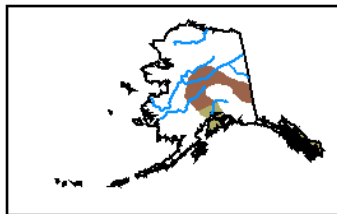


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:
Brad Pugh
NOAA/NWS/NCEP/Climate Prediction Center

-  Drought persists/intensifies
-  Drought remains but improves
-  Drought removal likely
-  Drought development likely



<http://go.usa.gov/hHTe>

Summary - Conditions

- * El Niño current and strengthening
- * Some current impacts
- * Very likely to impact winter across nation

- * Mixed Temp. and Precip. currently from some places quite wet to fairly dry
- * Drought in western MT
- * Current ag conditions generally OK

Summary - Outlooks

- * Wetter conditions more likely in the fall central and southern plains
- * Could extend further north (composites and models)
- * Winter likely warmer northern areas of basin
- * Dry quite likely MT/parts WY
- * Less snow accumulation mountains/plains

Further Information - Partners

- **Today's and Past Recorded Presentations and :**
- * <http://mrcc.isws.illinois.edu/webinars.htm>
- <http://www.hprcc.unl.edu>
- NOAA's National Climatic Data Center: www.ncdc.noaa.gov
 - Monthly climate reports (U.S. & Global):
www.ncdc.noaa.gov/sotc/
- NOAA's Climate Prediction Center: www.cpc.ncep.noaa.gov
- Climate Portal: www.climate.gov
- U.S. Drought Portal: www.drought.gov
- National Drought Mitigation Center: <http://drought.unl.edu/>
- State climatologists
 - * <http://www.stateclimate.org>
- Regional climate centers
 - * <http://mrcc.isws.illinois.edu>
 - * <http://www.hprcc.unl.edu>

Thank You and Questions?

- * Questions:

- * **Climate:**

- * Dennis Todey: dennis.todey@sdstate.edu , 605-688-5141

- * Doug Kluck: doug.kluck@noaa.gov, 816-994-3008

- * John Eise: john.eise@noaa.gov, 816-268-3144

- * Mike Timlin: mtimlin@illinois.edu; 217-333-8506

- * Natalie Umphlett: numphlett2@unl.edu ; 402 472-6764

- * Brian Fuchs: bfuchs2@unl.edu 402 472-6775

- * **Weather:**

- * crhroc@noaa.gov

- * Probabilities
- * Potential pitfalls

